

What is claimed is:

1. A method for lessening damage to neural tissue located within the a patient after said neural tissue has become ischemic or has been otherwise affected by a disease or trauma, comprising:
 - A. selecting a portion of the body containing the tissue, which portion receives a flow of blood;
 - B. providing a heat exchange catheter device which comprises;
 - i) an elongate, flexible catheter having a proximal end, a distal end, and a portion for insertion into a patient's body;
 - ii) at least one fluid lumen through which a water-based heat exchange fluid may be circulated; and
 - iii) a heat exchanger located at the distal end of the catheter, said heat exchanger being operative to exchange heat between blood which flows in heat exchange proximity to said heat exchanger and the water-based heat exchange fluid which is circulated through said catheter;
 - C. inserting the catheter into a blood vessel of the patient and positioning the catheter such that fluid flowing through the vessel will pass in heat exchange proximity to the heat exchanger before reaching the selected body portion;
 - D. circulating the water-based heat exchange fluid through the fluid lumen of the catheter device, such that blood will pass in heat exchange proximity to the heat exchanger, the water-based heat exchange fluid being at a temperature other than the blood,

whereby the temperature of the blood will be altered, and will subsequently flow to said neural tissue;

E. maintaining the catheter in said position for a sufficient time to alter the temperature of the neural tissue.

2. The method of claim 1, wherein the blood vessel is an artery.

3. The method of claim 1, wherein the blood vessel is a vein.

4. The method of claim 1, wherein the body portion in is the brain.

5. The method of claim 4, further comprising:

F. maintaining the selected portion of the body at a temperature different than that of the rest of the patient's body.

6. The method of claim 1, wherein the neural tissue is located in the brain and the blood vessel is selected from the group consisting of:

right common carotid artery;

left common carotid artery;

right internal carotid artery; and

left internal carotid artery.

7. The method of claim 1, wherein the catheter device provided in Step A further comprises a working lumen and wherein the method further comprises the step of:

F. infusing a medicament through the working lumen of the catheter to deliver said medicament to the neural tissue.

8. The method of claim 7, wherein the medicament is selected from the group of medicaments consisting of:
 - a thrombolytic agent; and
 - an anticoagulant;
9. The method of claim 1, wherein the neural tissue is brain tissue which has become ischemic or has suffered insult due to stroke.
10. The method of claim 1, wherein the neural tissue is brain tissue which has suffered insult due to cardiac arrest.
11. A method for changing the temperature of a selected region of a patient's body, comprising:
 - A. providing a heat exchange catheter device which comprises an elongate flexible catheter, said catheter having an insertion portion which is inserted into a patient's body, having a heat exchanger, said heat exchanger operative to exchange heat between blood which flows in heat exchange proximity to said heat exchanger;
 - B. inserting the catheter into a blood vessel of the patient's body through which blood flows to the selected region of the patient's body, and positioning the catheter such that blood flowing through the blood vessel to the selected region will pass in heat exchange proximity to the heat exchanger before reaching said selected region; and
 - C. utilizing the heat exchanger of the catheter device to change the temperature of blood which passes in heat exchange proximity to the heat exchanger, such that said blood will subsequently change the temperature of said selected region of the patient's body.

12. The method of claim 11, wherein the method is performed to warm the selected region.
13. The method of claim 11, wherein the method is performed to cool the selected region to a temperature below normal body temperature.
14. The method of claim 11, wherein the catheter device provided in Step A comprises:
 - i) an elongate, flexible catheter having a proximal end and a distal end;
 - ii) at least one fluid lumen through which a liquid-based thermal exchange fluid may be circulated through the catheter; and
 - iii) said heat exchanger being located at a distal location on the catheter and being operative to exchange heat between blood which flows in heat exchange proximity to said heat exchanger and the liquid-based thermal exchange fluid which is circulated through said catheter.
15. The method of claim 14, wherein Step iii of the method is carried out by circulating a water-based heat exchange fluid through the fluid lumen of the catheter.
16. The method of claim 11, wherein the method is performed to warm the selected region.
17. The method of claim 11, wherein the method is performed to cool the selected region to a temperature below normal body temperature.

18. The method of claim 11, wherein the catheter device provided in Step A further comprises a working lumen and wherein the positioning of the catheter in Step B is accomplished by advancing the catheter over a previously inserted guide wire such that the guide wire extends through the working lumen of the catheter.
19. The method of claim 11, further comprising:
 - D. infusing a drug through the catheter to deliver said drug to the selected region of the patient's body.
20. The method of claim 19, wherein the drug is selected from the group of drugs consisting of:
 - a thrombolytic agent;
 - an anticoagulant.
21. A cooling system, comprising:
 - catheter means for conveying a liquid coolant into a patient's body without directly contacting the coolant with the body;
 - heat exchanger means communicating with the catheter means for receiving therefrom and returning thereto coolant;
 - cooling means in thermal contact with the heat exchanger means for conveying heat away from the heat exchanger means; and
 - at least first and second heat exchanger means in fluid series with each other and first and second cooling means associated with the first and second heat exchanger means.

22. An apparatus for changing and maintaining the temperature of at least a portion of the body of a patient, the apparatus comprising:
- an indwelling catheter adapted for heat exchange within the body;
 - a primary fluid circuit in fluid flow communication with the indwelling catheter, the primary circuit adapted to contain a first circulating liquid therein;
 - a secondary fluid circuit which is in heat exchange relationship with the primary fluid circuit and adapted to contain a second circulating liquid therein, the first and second liquids being in fluid-flow isolation from each other; and
 - a temperature control module for changing the temperature of the second liquid.
23. The method of claim 20, further comprising a heat exchanger for effecting heat exchange between the primary and secondary fluid circuits.
24. An apparatus for changing or maintaining the temperature of at least a portion of a body of a patient, the apparatus comprising:
- means for exchanging heat with the portion of the body;
 - a primary fluid circuit in fluid communication with the means for exchanging heat, the primary circuit adapted to contain a first circulating liquid therein;
 - a secondary fluid circuit in heat exchange relationship with the primary fluid circuit and adapted to contain a second circulating liquid therein, the first and second liquids being in isolation from each other; and
 - means for changing the temperature of the second liquid.
25. A tubing set for delivery of a heat exchange liquid between a heat exchanger and an indwelling catheter, the tubing set comprising:

first tubing means for delivery of liquid between the heat exchanger and the indwelling catheter;

a second tubing means for delivery of liquid between the indwelling catheter and a liquid reservoir; and

third tubing means for delivery of liquid between the reservoir and the heat exchanger.

26. An apparatus for changing the temperature of at least a portion of the body of a patient, the apparatus comprising:

an indwelling catheter adapted for heat exchange within the body;

a primary fluid circuit in fluid flow communication with the indwelling catheter, the primary fluid circuit adapted to contain a first liquid circulating at a first rate therein;

a secondary fluid circuit which is in heat exchange relationship with the primary fluid circuit and adapted to contain a second liquid circulating at a second rate therein, the first and second liquids being in fluid flow isolation from each other; and

a temperature control module for establishing a heat exchange rate between the indwelling catheter and the body of the patient.

27. A kit for positioning a catheter including a distal heat exchange element in a vessel of a patient, comprising:

a catheter;

a guide catheter slidably engageable with the catheter and movable between a proximal position, wherein the heat exchange element is exposed, and a distal position, wherein the heat exchange element is constrained within the guide catheter; and

an introducer positionable in a patient and configured for cooperation with the guide catheter, the guide catheter being removable from the catheter when the heat exchange element is within the introducer sheath, the catheter being advanceable through the introducer sheath toward the vessel.

28. A method of advancing a heat exchange element of a catheter into a patient, comprising the acts of:
 - engaging the catheter with a guide wire or guide catheter; and
 - using the guide wire of guide catheter to advance at least the heat exchange element into the patient.
29. A kit for therapeutic or prophylactic hypothermia, comprising:
 - at least a first guide wire or guide catheter; and
 - at least one catheter including a heat exchange element, at least the heat exchange element being engageable with the first guide wire or guide catheter to facilitate advancing the heat exchange element into a patient.
30. An apparatus for inducing hypothermia in a patient, comprising:
 - heat exchanger means for exchanging heat with the patient;
 - catheter means for carrying a liquid coolant to and from the heat exchanger means; and
 - guide wire or guide catheter means for facilitating advancing the heat exchanger means into the patient.